

BACHELOROMYCES, A NEW GENUS OF ANELLIDIC DEMATIACEOUS HYPHOMYCETES ON *PROTEA CYNAROIDES* IN SOUTH AFRICA

W. F. O. MARASAS

(Plant Protection Research Institute, Pretoria)

P. S. VAN WYK AND P. S. KNOX-DAVIES

(Department of Plant Pathology, University of Stellenbosch)

ABSTRACT

A description of *Batcheloromyces* Marasas, Van Wyk & Knox-Davies, a new genus of dematiaceous Hyphomycetes is given. The new genus is characterized by mycelial plugs in the stomata and superficial mycelium forming pulvinate radiating plates. The conidiogenous cells (annellides) are calyciform with distinct annellations and one- or two-celled, brown, bacilliform conidia are produced by successive percurrent proliferations of the conidiogenous cells. A single species, *B. proteae* sp. nov. on *Protea cynaroides* L. is included in the genus at present. The relationships of *Batcheloromyces* with other genera of dematiaceous Hyphomycetes are discussed.

UITTREKSEL

BACHELOROMYCES, 'N NUWE GENUS VAN ANELLIDIESE DONKERKLEURIGE HIFOMISETE OP *PROTEA CYNAROIDES* IN SUID-AFRIKA

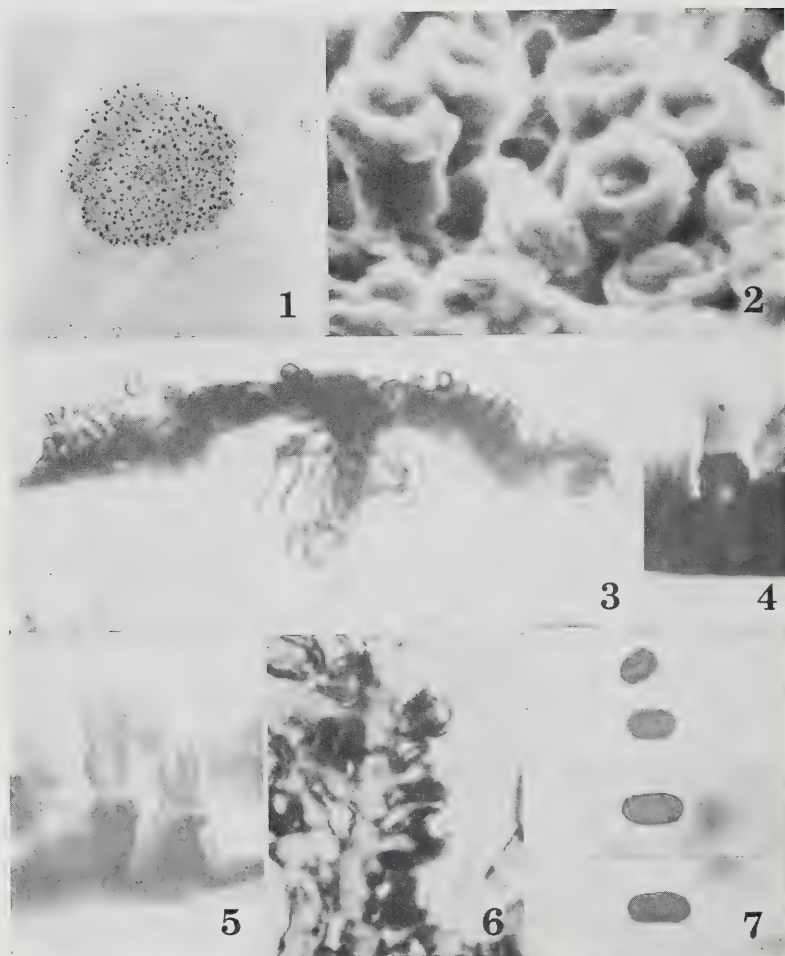
Batcheloromyces Marasas, Van Wyk & Knox-Davies, 'n nuwe genus van donkerkleurige Hifomisete word beskryf. Die nuwe genus word gekenmerk deur miseliumproppe in die huidmondjies en oppervlakkige miselium wat kussingvormige miseliumplate vorm. Die konidiogene selle (annellides) is koppievormig met duidelike annellasies en een- of twee-sellige, bruin, bacillusvormige konidiums word deur opeenvolgende proliferasies van die konidiogene sel deur die opening wat gelaat word deur die afskeiding van die vorige konidium, gevorm. Slegs 'n enkele spesie *B. proteae* sp. nov. op *Protea cynaroides* L. word tans in die genus geplaas. Die verwantskappe van *Batcheloromyces* met ander genera van Hifomisete word bespreek.

In the course of an investigation of foliicolous fungi of South African Proteaceae (Van Wyk, 1973), an interesting dematiaceous Hyphomycete was collected on *Protea cynaroides* in the Cape Province. This fungus differs from all the fungi that have been described on Proteaceae and from the known genera of dematiaceous Hyphomycetes (Ellis, 1971). Consequently it is described here as *Batcheloromyces proteae* gen. et sp. nov. The type specimen is deposited in the Mycological Herbarium of the Plant Protection Research Institute, Pretoria, Republic of South Africa (PREM).

Batcheloromyces Marasas, Van Wyk et Knox-Davies gen. nov.

Deuteromycotina, hyphomycetes. *Coloniae* orbiculatae, radiantes, atrae, maculas rufobrunneas efficientes. *Mycelium* partim in stomatibus immersum, partim superficiale, ex hyphis ramosis, septatis, brunneis, ab stromatibus

Accepted for publication 22nd January, 1974.



FIGS. 1-7.

Batcheloromyces proteae, type material (PREM 44850). 1, Colony on leaf of *Protea cynaroides* showing the black, pulvinate plates of radiating mycelium, X4; 2, Calyciform conidiogenous cells on superficial mycelium. Uncoated material on leaf examined under a Coates and Welter Model 100-4 field emission scanning electron microscope, X8500; 3, Section through leaf of *P. cynaroides* showing the mycelial plug in the stoma and the superficial plate of radiating mycelium on the leaf surface above the stoma, X900; 4, Annellide with three annellations and an undetached conidium, X2500; 5, Annellides with two successively formed conidia clinging together in false basipetal chains, X2500; 6, Calyciform conidiogenous cells (annellides) produced as lateral erect or ascending branches on the superficial hyphae, X2000; 7, One-celled, brown, bacilliform conidia, X1300.

pulvinatis ramosis compositum. *Conidiophora* macronemata, mononemata, simplicia, brunnea, solitaria ex lateribus hypharum oriunda. *Cellae conidiogenae* monoblasticae, in conidiophoris incorporatae, terminales, brunneae, calyciformeae, percurrentes. *Conidia* singulatim in apice conidiophori oriunda, solitaria sed interdum in catenis falsis curtis persistentia, sicca, brunnea, crassitunicata, laevia, ellipsoidea vel bacillaria, continua vel uniseptata.

Species typica: *Batcheloromyces proteae* Marasas, Van Wyk et Knox-Davies

Colonies on leaves circular, radiating, black in colour, causing reddish-brown leaf spots. *Mycelium* in the leaf tissue restricted to the stomata as stromatic mycelial plugs. On the leaf surface the mycelium forms pulvinate, sporodochium-like plates of radiating olivaceous-brown hyphae above the stomata and a network of delicate, branched, septate, superficial hyphae closely adhering to the leaf surface. *Conidiophores* macronematous, mononematous, simple, brown, arising as short, erect or ascending branches of the superficial hyphae, usually composed of a single terminal conidiogenous cell. *Conidiogenous cells* (*annellides*) monoblastic, integrated, terminal, brown, calyciform, percurrent with distinct annellations. *Conidia* arise solitarily as blown-out ends of the apex of the conidiogenous cell, dry, brown, smooth, thick-walled, ellipsoidal or bacilliform with rounded ends or a truncate base and rounded apex, one-celled or with a single transverse septum; conidia produced by successive percurrent proliferations of the conidiogenous cell may hang together in short fragile, false basipetal chains.

Etymology: The genus is named after Mr. F. C. Batchelor of Stellenbosch on whose farm the type species was collected.

Batcheloromyces proteae Marasas, Van Wyk et Knox-Davies sp. nov.

Coloniae amphigenae, usque ad 2 cm diam. *Stromata* superficialia, pulvinata, 110-250 μm diam. Hyphae 2.2-4.2 μm crassae. *Conidiophora* effusa sed creberrima in centro coloniae, plerumque ex cella conidiogena una composita. *Cellae conidiogenae* calyciformes, usque ad 3 proliferationes successivas (= annellaciones) producentes, 3.0-5.3 μm longae, 3.3-4.8 μm latae ad apicem, 2.2-3.1 μm latae ad basim. *Conidia* solitaria vel usque ad 3 conidia interdum in catenis falsis fragilibus persistentia, brunnea, laevia, crassitunicata, ellipsoidea vel bacillaria, continua vel uniseptata, 3.9-9.1 $\times$ 2.8-4.2 μm .

Habitat in foliis vivis *Protea cynaroides* L., Stellenbosch, Cape Province, Republic of South Africa, 15 viii. 1973, Van Wyk, PREM 44850, holotypus.

Colonies on leaves amphigenous, circular, radiating, up to 2 cm diam, discrete but becoming confluent and covering large areas of leaf surface, black, causing a reddish-brown discolouration of the leaf tissue (Fig. 1) which may be visible in the corresponding areas of the opposite leaf surface. *Mycelium*

in the leaf tissue composed of thick, dark brown, stromatic mycelial plugs in the stomata (Fig. 3), but no subcuticular or intra-epidermal mycelium could be seen. The mycelial plugs are erumpent through the stomata and form black, pulvinate, sporodochium-like plates of radiating hyphae above the stomata (Fig. 3) and a network of delicate superficial hyphae closely adhering to the leaf surface. Each colony comprises numerous black superficial mycelial plates, 110-250 μm diam (Fig. 1) and these plates are composed of a single layer of radiating, septate, branched, brown hyphae, 2.2-4.2 μm diam. *Conidiophores* arise solitarily as short, simple, erect or ascending, lateral branches on the superficial hyphae (Fig. 2,6), effuse but concentrated in the centre of the colonies directly above the stomata, usually consisting of a single terminal conidiogenous cell (Fig. 2,6) but sometimes the conidiogenous cell proliferates through the conidial scar to produce a second conidiogenous cell or a hypha which can presumably give rise to a second conidiogenous cell at a higher level. *Conidiogenous cells* (*annellides*) are brown, integrated, terminal, percurrent with up to three annellations (Fig. 4), typically calyciform, 3.0-5.3 μm long, 2.2-3.1 μm diam at the base and widening towards the apex which is 3.3-4.8 μm wide (Fig. 2,6), sometimes doliiform, 3.0-4.6 μm high and 2.3-3.8 μm wide. *Conidia* arising singly as blown-out ends of the apex of the conidiogenous cell (Fig. 4,6), solitary, or conidia produced by successive percurrent proliferations of the conidiogenous cell may hang together in fragile, false basipetal chains of two or three conidia (Fig. 5), dry, brown, oblong-ellipsoidal or bacilliform with both ends rounded or truncate at the base, smooth, thick-walled, one-celled (Fig. 7) or rarely with a single transverse septum and then not constricted at the septum, 3.9-9.1 $\times$ 2.8-4.2 μm .

On living leaves of *Protea cynaroides* L., Protea Heights, Devon Valley, Stellenbosch district, Cape Province, 15 August 1973, *Van Wyk* (PREM 44850, holotype).

Specimens examined: CAPE—Protea Heights, Stellenbosch, 15 August 1973, *Van Wyk* (PREM 44850, holotype); Assegaaibos, Jonkershoek, Stellenbosch, 23 August 1972, *Van Wyk* (PREM 44852); Oudebos, Betty's Bay, 15 March 1973, *Van Wyk* (PREM 44851); George, 25 September 1973, *Van Wyk* (PREM 44916).

The annellations on the conidiogenous cells are so conspicuous under the light microscope (Fig. 4) that we can only assume that this fungus belongs in Section III of Hughes' original classification (Hughes, 1953b) and that conidial development is annellidic as defined by the "First International Specialists' Workshop-Conference on Criteria and Terminology in the Classification of Funge Imperfecti" (Kendric, 1971). If this interpretation is in fact correct, *Batcheloromyces* appears to be related to the form-genera *Deightoniella* Hughes, *Pollaccia* Baldacci & Ciferri, *Spilocea* Fries and *Oedothea* Sydow as defined

by Hughes (1953a) and Ellis (1971). The vegetative mycelium and calyciform annellides are also similar to those of the genus *Phragmospathula* as described by Subramanian and Nair (1966). The combination of morphological characteristics of the fungus on *P. cynaroides*, i.e. mycelial plugs in the stomata, superficial plates of radiating mycelium, calyciform annellides and brown, thick-walled, bacilliform, one- or two-celled conidia, clearly differentiates it from all these apparently related genera. In the absence of electron microscopic studies of conidium ontogeny, it is not possible to draw final conclusions as to the relationships of *Batcheloromyces* at present.

ACKNOWLEDGEMENTS

The authors are indebted to Dr. M. B. Ellis of the Commonwealth Mycological Institute, Kew for his examination of a portion of the type collection and for helpful comments.

REFERENCES

- ELLIS, M. B., 1971. *Dematiaceous Hyphomycetes*. Kew: Commonwealth Mycological Institute.
- HUGHES, S. J., 1953a. Some foliicolous Hyphomycetes. *Can. J. Bot.* **31**: 560–577.
- HUGHES, S. J., 1953b. Conidiophores, conidia and classification. *Can. J. Bot.* **31**: 577–659.
- KENDRICK, B., (ed.), 1971. *Taxonomy of Fungi Imperfecti*. Toronto: Univ. of Toronto Press.
- SUBRAMANIAN, C. V. and NAIR, N. G., 1966. *Panchanania* and *Phragmospathula*, two new genera of the Hyphomycetes. *Antonie van Leeuwenhoek—J. Microbiol. Serol.* **32**: 381–386.
- VAN WYK, P. S., 1973. *Funguspatogene van die genera Protea, Leucadendron en Leucospermum met spesiale verwysing na Phytophthora cinnamomi*, Ph. D. Thesis. Stellenbosch: Univ. of Stellenbosch.